EV Battery and Telematics Terminology Glossary

By Navionyx Mobility Solutions
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Introduction

This glossary is designed for fleet operators, NBFC analysts, insurance underwriters, dealership teams, and anyone who works with EV battery data but does not come from a deep electrochemistry background. Every term is explained in plain language with a practical example showing how it applies in real EV operations. Terms are organised alphabetically.

A

Active Balancing

A cell balancing method where energy is redistributed from higher charged cells to lower charged cells, rather than being wasted as heat. More efficient than passive balancing, but requires more complex circuitry. Active balancing systems preserve more usable energy in the pack and help maintain uniform cell health over time.

Practical example: In a pack with 96 cells, if cell 47 is at 4.15V while cell 12 is at 3.95V, active balancing transfers energy from cell 47 to cell 12 rather than burning off the excess. The result is more usable energy retained in the pack.

B

Battery Passport

A digital identity system assigning every EV battery a unique identification code and QR code for lifecycle tracking. India's CPCB has proposed mandatory battery passports from 2026, covering manufacturing details, chemistry, performance history, safety records, and recycling status. Aligns with the EU's battery passport framework.

Practical example: A dealership scanning a battery passport QR code would see the pack's manufacturing date, cell chemistry (NMC vs LFP), cumulative cycle count, and whether it has been through any recalls or warranty events.

BMS (Battery Management System)

The onboard computer that monitors and manages the battery pack. It tracks voltage, current, and temperature of every cell, controls charging and discharging to stay within safe limits, performs cell balancing, and communicates battery status to the vehicle's main systems. The BMS is the brain of the battery pack.

Practical example: When you plug in an EV and the charging slows down as it approaches 80%, that is the BMS reducing current to protect the cells from overcharging stress. The BMS also cuts off discharge if any cell drops below its safe minimum voltage.

BWMR (Battery Waste Management Rules, 2022)

Indian regulation making Extended Producer Responsibility (EPR) mandatory for battery producers. Requires OEMs and importers to collect and recycle or refurbish a minimum percentage of waste batteries. Fleet operators are legally required to return end of life batteries to authorised recyclers.

Practical example: An EV fleet operator decommissioning 50 vehicles must ensure the battery packs are returned to an authorised recycler, not disposed of through general waste channels.

C

Calendar Aging

Battery degradation that occurs over time even when the battery is not being used. High storage temperatures and maintaining the battery at 100% charge accelerate calendar aging. A fleet vehicle parked in a hot warehouse for months will lose capacity even without being driven.

Practical example: Two identical EVs purchased the same month, one driven daily and one stored in a hot warehouse at 100% charge for a year, may show similar cycle counts but very different SoH readings. The stored vehicle's calendar aging can be substantial.

Capacity Fade

The gradual reduction in a battery's ability to store energy over time and usage. Measured as the difference between the original rated capacity and the current maximum capacity. A battery with 15% capacity fade holds 15% less energy than when it was new.

Practical example: A Tata Nexon EV with a 30.2 kWh battery showing 15% capacity fade now holds approximately 25.7 kWh. That translates directly to reduced range, from roughly 312 km rated to approximately 265 km real world.

Cell Balancing

The process of equalising the charge across all individual cells in a battery pack. Without balancing, some cells degrade faster than others, reducing overall pack capacity and creating safety risks. Two methods exist: passive balancing (bleeds excess energy as heat) and active balancing (redistributes energy between cells).

Practical example: In a healthy pack, all cells sit within 10mV to 20mV of each other. When one cell drifts 50mV or more from the average, balancing circuits work harder to compensate, and the pack's effective usable capacity is limited to the weakest cell.

Cell Voltage Variance

The difference in voltage readings between individual cells within a battery pack. In a healthy pack, all cells operate at nearly identical voltages. As a pack ages, cells drift apart. High variance is a leading indicator of accelerated capacity loss, even if overall SoH still looks acceptable.

Practical example: A pack showing 86% SoH but with two cells reading 3.82V while the rest read 3.95V has a significant variance problem. The weak cells will continue to degrade faster and pull the entire pack's usable capacity down over time.

Coulomb Counting

A method used by the BMS to estimate State of Charge by measuring the current flowing in and out of the battery over time. Accurate in the short term but drifts over extended periods, requiring periodic recalibration through other methods like Open Circuit Voltage (OCV) measurement.

Practical example: The BMS tracks that 10 Ah of current has flowed out of a 50 Ah battery and estimates 80% SoC remaining. Over many cycles, small measurement errors accumulate, which is why BMS systems periodically recalibrate using OCV readings when the battery is at rest.

C Rate

The rate at which a battery is charged or discharged relative to its total capacity. 1C means the full capacity in one hour. DC fast charging typically operates at 1C to 2C. Slow AC home charging operates at 0.2C to 0.5C. Higher C rates generate more heat and accelerate degradation.

Practical example: A 40 kWh battery charged at 50 kW DC (approximately 1.25C) fills in roughly 48 minutes but generates significant heat. The same battery charged at 7 kW AC (approximately 0.175C) takes about 5.5 hours but with minimal thermal stress.

Cycle Count

The total number of full charge and discharge cycles a battery has completed. One full cycle equals discharging from 100% to 0% and back to 100%. Two discharges from 100% to 50% count as one full cycle. Higher cycle counts correlate with more degradation.

Practical example: A fleet vehicle doing 100 km daily on a 300 km range battery completes roughly one full cycle every three days. Over three years, that is approximately 365 full cycles. A ride hailing vehicle doing 250 km daily completes nearly one full cycle daily, reaching 1,000+ cycles in three years.

D

DoD (Depth of Discharge)

The percentage of a battery's total capacity used before recharging. An 80% DoD means the battery was discharged to 20% remaining. Deeper discharges place more stress on the cells. Keeping DoD below 80% for daily use extends battery life measurably.

Practical example: An operator who routinely runs vehicles down to 5% before charging subjects the pack to deep discharge stress. Running between 20% and 80% SoC (60% DoD per cycle) can extend the battery's usable life by 30% or more compared to regular 90% DoD cycles.

E

EOL (End of Life)

The point at which a battery's State of Health drops below the threshold for its intended application. For EVs, this is typically 70% to 80% SoH. At EOL, the battery still works but no longer provides sufficient range. Many EOL EV batteries enter "second life" applications like stationary energy storage.

Practical example: An 8 year old EV battery at 72% SoH may not provide enough range for daily commuting, but it can still store energy for a solar installation, warehouse backup, or EV charging station buffer.

EPR (Extended Producer Responsibility)

A regulatory framework making battery producers responsible for collection, recycling, and safe disposal of batteries at end of life. Under India's Battery Waste Management Rules 2022, OEMs and importers must register with CPCB and meet minimum recycling targets.

Practical example: Tata Motors, MG Motor, and other EV manufacturers operating in India must demonstrate compliance with EPR targets by partnering with authorised battery recyclers and reporting recycling volumes to CPCB annually.

F

Fast Charge Ratio

The proportion of total charging events that used DC fast charging versus slow AC charging. A high fast charge ratio (above 30% to 40%) indicates more thermal stress, which accelerates degradation. Navionyx tracks this ratio as part of the EV Certificate.

Practical example: A vehicle with 1,200 total charging events, of which 480 were DC fast charges, has a fast charge ratio of 40%. This is moderate. A fleet vehicle with 80% fast charge ratio has experienced significantly more thermal cycling.

I

Internal Resistance

The opposition to current flow within the battery. Internal resistance increases as the battery ages. Higher resistance means more energy lost as heat, less usable energy delivered, and reduced range and peak performance.

Practical example: A new battery pack might have internal resistance of 50 milliohms. After 1,000 cycles, that may rise to 75 milliohms. The increased resistance means the battery's ability to deliver high current (acceleration, fast charging) diminishes.

L

LFP (Lithium Iron Phosphate)

A lithium ion battery chemistry known for longer cycle life (3,000+ cycles), better thermal stability, and lower cost per kWh compared to NMC. Trade off is lower energy density, meaning larger and heavier packs for the same range. Increasingly used in Indian EVs.

Practical example: The BYD Atto 3 uses an LFP blade battery. While heavier than an equivalent NMC pack, the LFP chemistry tolerates more charge cycles and handles heat better, making it well suited for Indian climate conditions and fleet applications.

N

NMC (Nickel Manganese Cobalt)

A lithium ion battery chemistry offering higher energy density than LFP, meaning more range from a smaller, lighter pack. Trade off is shorter cycle life, higher thermal sensitivity, and higher cost. Used in many premium and performance EVs.

Practical example: The MG ZS EV uses NMC chemistry for its 44.5 kWh pack. Higher energy density allows longer range from a compact pack, but the cells are more sensitive to high temperatures and aggressive fast charging compared to LFP.

O

OCV (Open Circuit Voltage)

The voltage measured across a battery's terminals when no current is flowing. OCV has a known relationship to State of Charge for each chemistry type. The BMS uses OCV measurements to recalibrate SoC estimates periodically.

Practical example: After an EV sits overnight without charging, the BMS measures OCV and uses the chemistry specific voltage to SoC curve to correct any drift in its coulomb counting based SoC *estimate.*

P

Passive Balancing

A cell balancing method where excess energy from higher voltage cells is bled off as heat through resistors, bringing them down to match the lowest cell. Simpler and cheaper than active balancing but wastes energy. The most common balancing method in current production EVs.

Practical example: If cell 23 in a 96 cell pack reaches 4.2V while most cells are at 4.1V, passive balancing burns off the 0.1V difference through a resistor. The energy is lost but the pack remains balanced.

R

Regenerative Braking

A system where the electric motor acts as a generator during deceleration, converting kinetic energy back into electrical energy and feeding it into the battery. Reduces brake wear and extends range.

Practical example: A delivery EV operating in stop and go city traffic recovers significant energy through regenerative braking. Over a typical urban delivery route, regeneration can add 15% to 20% effective range compared to a non regenerative system.

S

SoC (State of Charge)

The current charge level of the battery as a percentage of its current maximum capacity. Similar to a fuel gauge. SoC is a snapshot of current charge, not a measure of overall battery health.

Practical example: A fully charged EV showing 100% SoC does not tell you anything about the battery's health. A battery at 80% SoH showing 100% SoC actually holds only 80% of the energy it held when the SoC showed 100% on day one.

SoH (State of Health)

The overall condition of a battery compared to when it was new, expressed as a percentage. A battery at 90% SoH holds 90% of its original energy capacity. SoH is the most referenced metric in used EV valuations, but it is a headline number, not a complete picture.

Practical example: Two identical EVs both showing 85% SoH can have very different remaining lifespans. One was home charged gently for three years. The other was fast charged daily in a ride hailing fleet. The headline SoH is the same, but the degradation trajectory is not.

SoP (State of Power)

An estimate of the maximum power the battery can deliver or absorb at a given moment. SoP changes with temperature, SoC, and battery age. The BMS uses SoP to prevent the vehicle from demanding more current than the battery can safely provide.

Practical example: On a cold morning, the battery's SoP is temporarily reduced. The vehicle may limit acceleration power and regenerative braking strength until the pack warms up to its optimal operating range.

T

Thermal Management System

The system responsible for maintaining the battery pack within its optimal temperature range (typically 15°C to 35°C). Two main types: liquid cooling (circulates coolant through channels) and air cooling (passes air over the cells). Liquid cooling is more effective and used in most modern Indian EVs.

Practical example: The Tata Nexon EV uses a liquid cooled battery pack. During a summer day in Delhi NCR at 45°C, the thermal management system actively cools the pack to prevent cells from exceeding their safe operating range.

Thermal Runaway

A dangerous condition where a battery cell overheats uncontrollably, potentially causing fire or explosion. Can be triggered by internal short circuits, physical damage, overcharging, or sustained extreme heat. Modern BMS systems include multiple layers of protection.

Practical example: A battery pack with underbody damage from a road hazard may have a compromised cell that generates heat internally. If the BMS fails to detect and isolate the affected cell, temperatures can escalate rapidly. This is why underbody inspection is critical in used EV assessment.

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